

AMENDMENTS TO THE SPECIFICATION

Please replace the paragraph starting on Page 41, line 25, through Page 42, line 21, with:

In the GaN-GTO thyristor element 51 shown in FIG. 4, a p-type GaN p-base region 53 having low impurity concentration and a thickness of approximately 35 μm is formed on the upper face of an n-type GaN cathode region ~~52(sic)~~ 51a having high impurity concentration and a thickness of approximately 250 μm . An n-type GaN n-base region 54 having high impurity concentration and a thickness of approximately 1.7 μm is formed in the central region of the p-base region 53. A cathode electrode 66 is provided ~~[[On]]~~ on the lower face of the cathode region 52. An n-type SiC field relaxation region 56 is formed inside the p-base region 53 around the n-base region 54. A gate electrode 58 made of metal is provided in the right end portion of the n-base region 54. An n-type SiC anode region 55 having a thickness of 3 μm is provided on the n-base region 54 excluding the portion of the gate electrode 58. An anode electrode 59 of metal having a light emission window 60 is provided on the anode region 55. A surface protection film 57 having a two-layer structure comprising a silicon nitride layer and a silicon dioxide layer is formed on the p-base region 53 and the field relaxation region 56.

Please replace the second paragraph on Page 48 starting at line 9 through line 19 with:

The GaN-GTO thyristor element 51 in accordance with this embodiment was heated to 185°C, and a current of 160 A was passed at a high current density of 240 A/cm² and at a cyclic frequency of 3 kHz. The ON voltage at this time was 3.6 V, the turn ON time was 0.3 ~~$\mu\text{ms(sic)}$~~ μs , the turn OFF time was 0.7 μs , the steady loss was approximately 288 W, and the switching loss was 68 W. The junction temperature of the GaN-GTO thyristor element 51 has reached approximately 410°C in a short time owing to this energization.

Please replace the third paragraph on Page 54, starting at line 7 through line 18 with:

A current of 200 A at a cyclic frequency of 5 kHz and a current density of 360 A/cm² is passed through the SiC-pn diode device 19a. At this time, the ON voltage was 2.3 V, and the reverse recovery charge was 10.4 μC . In addition, the steady loss was approximately 260 W, and the

switching loss was approximately 31 W. When the fan ~~99(sic)~~ 98 was driven to send a wind to the heat sink 88 so that the heat resistance between the air and the heat sink 88 was approximately $1^{\circ}\text{C}/\text{W}$, it was possible to set the junction temperature of the pn diode element 13a at approximately 350°C .

Please replace the paragraph starting on Page 54, line 19, through Page 55, line 19 with:

In the case of a conventional Si-pn diode having a withstand voltage of 7.0 kV, the ON voltage was 3.4 V and the reverse recovery charge was approximately 113 μC at the time when a current of 150 A (current density of approximately $50\text{ A}/\text{cm}^2$) was passed through at a junction temperature of 125°C . The steady loss of the SiC-pn diode device 19a in accordance with this embodiment is approximately 90% in comparison with the above-mentioned conventional Si-pn diode. Furthermore, since the reverse recovery charge of the pn diode device in accordance with this embodiment is smaller by approximately one order of magnitude, the switching loss thereof also becomes smaller by approximately one order of magnitude. The total loss of the SiC-pn diode device ~~19(sic)~~ 19a can be reduced significantly to approximately 49% of that of the Si-pn diode. The ON resistance of the SiC-pn diode device 19a at a junction temperature of 350°C is smaller than the ON resistance of the Si-pn diode at a junction temperature of 125°C ; as a result, the total loss is smaller. Furthermore, the semiconductor maintains an energy gap of approximately 1.64 eV until it loses the property of a semiconductor, as it were, until it becomes the state of metal. Since this energy gap of the SiC, 1.64 eV, is larger than the energy gap of Si, high reliability with respect to temperature can be ensured.

Please replace the paragraph starting on Page 62, line 12, through Page 63, line 9, with:

A heater comprising a metallic resistor, such as a nichrome wire, covered with silicone rubber was used as a heater serving as a heating means for raising the temperature of the semiconductor element; however, for example, a plane-shaped heater obtained by subjecting a heating element disposed between two mica or ceramic sheets to forming using a pressure-welding press may also be used. In addition, heaters made of other materials, such as a ceramic heater and a cartridge heater,

and radiant heating means, such as an infrared lamp and a far-infrared ceramic heater, may also be used. Furthermore, as other methods, a method of blowing hot air to the semiconductor device using a heat gun or the like and a method of induction heating the metal support ~~15(sic)~~ 10 and the metal cap 14 of the semiconductor device using a high-frequency induction heating apparatus may also be used. The self-heating of the semiconductor element may also be used instead of the above-mentioned heating means. In this case, in the case of a semiconductor element having three electrodes, either a method of passing a current between the anode electrode and the base electrode or a method of passing a current between the anode electrode and the cathode electrode may be used.

Please replace the paragraph starting on Page 63, line 10, through Page 64, line 6, with:

In each of the above-mentioned embodiments, a TO-type package wherein a metal cap is used as the package of the semiconductor device is shown; however, a high heat-resistant resin cap may also be used instead of the metal cap. In addition, as the configuration of each semiconductor device, a mold-type configuration generally used for Si power modules, such as a stud type, a flat type and a SIP type made of a high heat-resistant resin, may also be used, other than the ~~TO(sic)~~ TOM type. As a method of controlling carrier life-time, irradiation of a gamma ray and irradiation of charged particles, such as protons and helium ions, may also be used, other than irradiation of an electron beam. In the above-mentioned embodiments, a three-phase inverter apparatus is taken as an application example; however, other power conversion apparatuses, such as a matrix inverter and a DC-DC converter, may also be used. Furthermore, the present invention is also applicable to other power conversion apparatuses, such as switching power supplies, rectifying apparatuses, regulators and high-frequency generators, other than inverters and converters.